f. X H-space, multiplication $\mu: X \times X \to X$
$\Rightarrow$ LX H-space, multiplication
$L\mu: LX \times LX \to LX$

and: k-th power map $k: X \to X \Rightarrow$
k-th power map $k = Lk: LX \to LX$

Cor: X s.c. finite complex, $\pi_2 X$ finite
$X\langle n\rangle$ H-space for some $n \Rightarrow$
$\hat{X}_p$ H-space

ex: $S^2\langle 2\rangle = S^3$ is H-space
but: $n > 1 \Rightarrow S^{2n}\langle k\rangle$ not H-space $\forall k$

Note: $X \to X_{(p)} \to \hat{X}_p$, $\pi_* X$ finite $\forall *$

$\Rightarrow X_{(p)} \xrightarrow{\cong} \hat{X}_p$

e.g. $S^{2n+1}\langle 2n+1\rangle_{(p)} = S^{2n+1}\langle 2n+1\rangle^{\wedge}_p$

<u>Cohen-Moore-Neisendorfer summary</u>:

Throughout, localize at a prime $p > 2$.

$\exists\, \pi: \Omega^2 S^{2n+1} \to S^{2n-1}$ such that:

$$\Sigma^2 \circ \pi = p: \begin{tikzcd} \Omega^2 S^{2n+1} \arrow[r, "\pi"] \arrow[rr, bend right, "p = p\text{-th power}"'] & S^{2n-1} \arrow[r, "\Sigma^2"] & \Omega^2 S^{2n+1} \end{tikzcd}$$ commutes.